

IN THE CLAIMS

Claims 1-34 (canceled)

35. (currently amended) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein said aqueous, acidic composition comprises:

8 to 50 g/l of phosphate, calculated as PO_4 ,

0.5 to 30 g/l of zinc ions,

0 to 5 g/l of manganese ions,

0 to 8 g/l of free calcium ions,

0 to 5 g/l of free magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0 to 2 g/L NO_3 ,

0 to < 0.8 g/L NO_2 ,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,

wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1; and cold forming the coated metal.

36. (previously presented) A process according to claim 35, wherein the composition comprises not more than 1 g/l of nitrate.

37. (previously presented) A process according to claim 35, wherein the composition comprises not more than 0.5 g/l of nitrite.
38. (previously presented) A process according to claim 35, wherein the composition comprises at least one of a complex fluoride or fluoride ions to magnesium ions in a range from 0.1 : 1 to 10 : 1.
39. (previously presented) A process according to claim 35, wherein the composition comprises at least one of a complex fluoride or fluoride ions to calcium ions in a range from 0.1 : 1 to 10 : 1.
40. (previously presented) A process according to claim 35, wherein the composition further comprises up to 2 g/l nickel ions.
41. (previously presented) A process according to claim 35, wherein the composition comprises chloride ions in the range up to 5 g/l.
42. (previously presented) A process according to claim 35, wherein the composition further comprises up to 2 g/l sulfate ions.
43. (previously presented) A process according to claim 35, wherein the composition comprises fluoroborate.
44. (currently amended) A process according to claim 35 ~~claim 24~~, wherein the composition comprises from 0.1 to 5 g/l BF₄.
45. (currently amended) A process according to claim 35 ~~claim 24~~, wherein the composition comprises from 0.2 to 3 g/l BF₄.
46. (previously presented) A process according to claim 35, wherein the pH of the composition is maintained in the range from 0.1 to 4.

47. (previously presented) A process according to claim 35, wherein a phosphate layer which has at least one of a layer thickness in the range from 0.02 to 15 μm or a layer weight in the range from 0.5 to 25 g/m^2 is formed on said surface.

48. (previously presented) A process according to claim 35, wherein a phosphate layer is formed on the surface which has an average edge length of the phosphate crystals of less than 20 μm or even of less than 10 μm and has a layer thickness with a layer weight in the range of 1.5 to 18 g/m^2 .

49. (previously presented) A process according to claim 48, wherein the layer weight is from 2 to 15 g/m^2 .

50. (previously presented) A process according to claim 35, wherein after the formation of the phosphate layer at least one layer comprising lubricant is applied.

51. (previously presented) A process for coating surfaces of metallic objects with a phosphating solution to form a coated metal, wherein the ratio of the pickling erosion on the metallic surface, measured in g/m^2 , to the layer weight of the phosphate layer, measured in g/m^2 , lies at values below 75% and wherein the ratio of free acid to total acid of said solution is from 0.25:1 to 0.11 to 1, and coldforming the coated metal.

52. (currently amended) An aqueous phosphating solution comprising:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

0 to 10 g/l of manganese ions,

0 to 16 g/l of free calcium ions,

0 to 10 g/l of free magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.05 to 10 g/l of nitroguanidine,
0 to 2 g/l of nitrate,
0.1 to 10 g/l in total of chlorate or/and peroxide ions,
in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,
wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,
0 to 5 g/l of fluoride ions,
wherein the total content of complex fluoride and fluoride ions is in the range
from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1.

53. (previously presented) A metallic object coated produced by the process of claim 35 that is coldformed.

54. (currently amended) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein the aqueous, acidic, composition consists essentially of:

8 to 50 g/l of phosphate, calculated as PO_4 ,
0.5 to 30 g/l of zinc ions,
0 to 5 g/l of manganese ions,
0 to 8 g/l of free calcium ions,
0 to 5 g/l of free magnesium ions,
wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,
0.1 to 5 g/l of nitroguanidine,
0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,
in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,
wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1, and coldforming the coated metal.

55. (currently amended) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein the aqueous, acidic composition consists of:

8 to 50 g/l of phosphate, calculated as PO_4 ,

0.5 to 30 g/l of zinc ions,

0 to 5 g/l of manganese ions,

0 to 8 g/l free of calcium ions,

0 to 5 g/l free of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,

wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1.

56. (canceled)

57. (currently amended) An aqueous phosphating solution consisting of:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

0 to 10 g/l of manganese ions,

0 to 16 g/l of free calcium ions,

0 to 10 g/l of free magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.05 to 10 g/l of nitroguanidine,

0 to 2 g/l of nitrate,

0.1 to 10 g/l in total of chlorate or peroxide ions, or both;

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,

wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1.

58. (currently amended) An aqueous phosphating solution comprising:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

0 to 10 g/l of manganese ions,

0 to 16 g/l of calcium ions,

0 to 10 g/l of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.05 to 10 g/l of nitroguanidine,

0 to 2 g/l of nitrate,

0.1 to 10 g/l in total of chlorate or peroxide ions or both;

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both, wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1, The aqueous phosphating solution of claim 56, wherein the solution is free of cobalt.

59. (canceled)

60. (currently amended) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein said aqueous, acidic composition comprises:

8 to 50 g/l of phosphate, calculated as PO_4 ,

0.5 to 30 g/l of zinc ions,

0 to 5 g/l of manganese ions,

0 to 8 g/l of calcium ions,

0 to 5 g/l of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0 to 2 g/L NO_3 ,

0 to < 0.8 g/L NO ,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both, wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1; and cold forming the coated metal ~~The aqueous phosphating solution of claim 35, wherein the solution is free of cobalt.~~

61. (previously presented) The aqueous phosphating solution of claim 35, wherein the solution is substantially free of cobalt.

62. (currently amended) A process for coating surfaces of metallic objects with a phosphating solution to form a coated metal, wherein the ratio of the pickling erosion on the metallic surface, measured in g/m^2 , to the layer weight of the phosphate layer, measured in g/m^2 , lies at values below 75% and wherein the ratio of free acid to total acid of said solution is from 0.25:1 to 0.11 to 1, and coldforming the coated metal ~~The process of claim 51, wherein the solution is free of cobalt.~~

63. (previously presented) The process of claim 51, wherein the solution is substantially free of cobalt.

64. (currently amended) An aqueous phosphating solution comprising:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

0 to 10 g/l of manganese ions,

0 to 16 g/l of calcium ions,

0 to 10 g/l of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.05 to 10 g/l of nitroguanidine,

0 to 2 g/l of nitrate,

0.1 to 10 g/l in total of chlorate or/and peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both, wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1 ~~The aqueous phosphating solution of claim 52,~~ wherein the solution is free of cobalt.

65. (previously presented) The aqueous phosphating solution of claim 52, wherein the solution is substantially free of cobalt.

66. (currently amended) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein the aqueous, acidic, composition consists essentially of:

8 to 50 g/l of phosphate, calculated as PO_4 ,

0.5 to 30 g/l of zinc ions,

0 to 5 g/l of manganese ions,

0 to 8 g/l of calcium ions,

0 to 5 g/l of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both, wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1, and coldforming the coated metal ~~The aqueous phosphating solution of claim 54,~~ wherein the solution is free of cobalt.

67. (previously presented) The aqueous phosphating solution of claim 54, wherein the solution is substantially free of cobalt.

68. (previously presented) The aqueous phosphating solution of claim 55, wherein the solution is free of cobalt.

69. (previously presented) The aqueous phosphating solution of claim 55, wherein the solution is substantially free of cobalt.

70. (previously presented) The aqueous phosphating solution of claim 57, wherein the solution is free of cobalt.

71. (previously presented) The aqueous phosphating solution of claim 57, wherein the solution is substantially free of cobalt.

72. (new) An aqueous phosphating solution comprising:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

0 to 10 g/l of manganese ions,

0 to 16 g/l of free calcium ions,

0 to 10 g/l of free magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,
0.05 to 10 g/l of nitroguanidine,
0 to 2 g/l of nitrate,
0.1 to 10 g/l in total of chlorate or peroxide ions or both;
in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,
wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,
0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range
from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1.

73. (new) The method of claim 72, wherein the aqueous phosphating solution is free
of cobalt.

74. (new) The method of claim 72, wherein the aqueous phosphating solution is
substantially free of cobalt.

75. (new) An aqueous phosphating solution comprising:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

0 to 10 g/l of manganese ions,

0 g/l of calcium ions,

0 g/l of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.05 to 10 g/l of nitroguanidine,

0 to 2 g/l of nitrate,

0.1 to 10 g/l in total of chlorate or peroxide ions or both;
in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,
wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1.

76. (new) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein said aqueous, acidic composition comprises:

8 to 50 g/l of phosphate, calculated as PO_4 ,

5 to 30 g/l of zinc ions,

0 to 5 g/l of manganese ions,

0 to 8 g/l of free calcium ions,

0 to 5 g/l of free magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0 to 2 g/L NO_3 ,

0 to < 0.8 g/L NO_2 ,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,
wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1; and cold forming the coated metal.

77. (new) A process comprising coating a surface of a metallic object with an aqueous, acidic composition to form a coated metal, wherein said aqueous, acidic composition comprises:

8 to 50 g/l of phosphate, calculated as PO_4 ,

5 to 30 g/l of zinc ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both,

wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1; and cold forming the coated metal.

78. (new) The process of claim 77, wherein the acidic composition comprises from 5 to 25 g/L zinc.

79. (new) An aqueous phosphating solution comprising:

8 to 100 g/l of phosphate, calculated as PO_4 ,

0.5 to 60 g/l of zinc ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.05 to 10 g/l of nitroguanidine,

0.1 to 10 g/l in total of chlorate or/and peroxide ions,

in total at least some to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both, wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.1:1 to 1.

80. (new) A process comprising coating a surface of a metal-rubber composite with an aqueous, acidic composition to form a coated metal-rubber composite, wherein said aqueous, acidic composition comprises:

8 to 50 g/l of phosphate, calculated as PO_4 ,

0.5 to 30 g/l of zinc ions,

0 to 5 g/l of manganese ions,

0 to 8 g/l of free calcium ions,

0 to 5 g/l of magnesium ions,

wherein at least 0.1 g/l of at least one of calcium or magnesium ions are present,

0.1 to 5 g/l of nitroguanidine,

0 to 2 g/L NO_3 ,

0 to < 0.8 g/L NO_2 ,

0.1 to 10 g/l in total of at least one of chlorate or peroxide ions,

in total 0 to 16 g/l of complex fluoride of the formula MeF_4 , MeF_6 , or both, wherein Me is selected from the group consisting of Si, Ti, Hf and Zr,

0 to 5 g/l of fluoride ions,

wherein the total content of complex fluoride and fluoride ions is in the range from 0.1 to 18 g/l and wherein the ratio of free acid to total acid is from 0.25:1 to 0.11 to 1; and cold forming the coated metal-rubber composite.